

ABSTRACT OF THE INVENTION

A vehicle occupant restraint system includes an airbag system and a seat belt harness with pretensioner and retractor mechanisms. Multiple sensors are mounted within the vehicle to measure and monitor various occupant and vehicle characteristics, which are entered into a central processing unit (CPU). These sensors include an occupant presence sensor for determining whether there is an occupant present within the airbag deployment area, a child seat sensor for determining whether a child seat is properly installed in the airbag deployment area, and a seat belt usage sensor for determining whether a seat belt is in an engaged position. The occupant presence, child seat, and seat belt usage sensors generate system modifier signals that can disable the airbag system or seat belt mechanisms if certain predetermined conditions are not satisfied. Other sensors include an occupant weight sensor, an occupant proximity sensor for determining occupant position relative to the airbag deployment area, a crash severity sensor, and a pre-crash sensor for providing vehicle speed and orientation characteristics prior to the collision. All of these sensors provide input signals that are received by the CPU. The CPU processes these multiple input signals with a fuzzy logic control system to generate multiple output signals for controlling the airbag and seat belt mechanisms. The multiple output signals can include a multi-stage airbag inflation signal, a variable venting signal, a seat belt pretensioner signal, and a seat belt retractor signal.